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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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[REDACTED] EXAMINER

STAHL, MICHAEL J

[REDACTED] ART UNIT [REDACTED] PAPER NUMBER

2874

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/917,039	AKWANI ET AL.
	Examiner	Art Unit
	Mike Stahl	2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on ____.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-17 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5) Claim(s) 9-11 and 17 is/are allowed.

6) Claim(s) 1,3-5 and 12-14 is/are rejected.

7) Claim(s) 2,4,6-8,15 and 16 is/are objected to.

8) Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 27 July 2001 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on ____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. ____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____ .
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)
3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2,3</u> .	6) <input type="checkbox"/> Other: _____

Information Disclosure Statement

The documents submitted 27 July 2001 and 3 September 2002 have been considered.

Initialed copies of form PTO-1449 are attached.

Claim Objections

Applicant is advised that should claim 3 be found allowable, claim 4 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k). Claim 4 is identical to claim 3.

3. Applicant may wish to change claim 4 to depend from claim 2 instead of claim 1.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Dalton et al. (US 3542572).

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Dalton discloses a germanium-silicon oxide glass composition having a $\text{Ge}/(\text{Si} + \text{Ge})$ mole ratio of 0.422 (example 2 of Table I), and an $\text{N}/(\text{N}+\text{O})$ mole ratio of 0. The Ge mole ratio in the example lies within the range specified by claim 1.

As to claims 3 and 4, the glass composition of example 2 has a coefficient of thermal expansion of approximately $4 \times 10^{-6} / ^\circ\text{C}$. Although Dalton is silent as to the refractive index of the composition, it is considered inherent that its refractive index lies within the range specified by claims 3 and 4 since the composition has Ge and Si proportions similar to those of applicant's composition.

Claims 12-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Storgaard-Larsen et al. (WO 97/23426).

Storgaard-Larsen discloses a glass composition having a $\text{Ge} / (\text{Si} + \text{Ge} + \text{Ti})$ mole ratio of 0.14 and a $\text{Ti} / (\text{Si} + \text{Ge} + \text{Ti})$ mole ratio of 0 (p. 6 lines 2-7). The Ge and Ti mole ratios lie within the ranges recited by claim 12.

As to claim 13, the glass composition taught by Storgaard-Larsen generally has a refractive index from 1.46 to 1.51, which overlaps the recited index range. It is considered inherent that the glass also has a coefficient of thermal expansion within the claimed range since its composition is similar to that of applicant's glasses.

As to claim 14, the glass composition containing Ge is used as the core layer in a planar waveguide (p. 6 lines 2-7; fig. 1).

Claims 1, 3, and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Maurer et al. (US 3884550).

Maurer discloses a glass composition having 40 wt. % germania and 60 wt. % silica (col. 9 lines 15-18. The composition is used as a cladding layer in a fiber preform. 40 wt. % Ge is equivalent to about 27.7 mole % Ge, and since there is no nitrogen intentionally added to the glass composition, the N/(N + O) mole ratio is 0. Therefore the composition satisfies the requirements of claim 1.

As to claims 3 and 4, a silica-germania glass composition having 40 wt % germania has a refractive index of about 1.495 (fig. 3), which is within the recited range. It is considered inherent that such a composition has a coefficient of thermal expansion within the recited range (e.g. see fig. 2 of the present application).

Claim 12 is rejected under 35 U.S.C. 102(b) as being anticipated by Yamagishi et al. (US 4495298).

Yamagishi discloses a glass composition (claim 1) having ranges for Ge and Ti mole ratios relative to Si + Ge + Ti which overlap the ranges set forth in claim 12. For example, claim 1 of the reference encompasses a composition having 80 mole % silica, 1 mole percent thallium oxide, 1 mole % thallium oxide + alkali metal oxide, 12 mole % germania, and 6 mole % titania. In this example, the Ge/(Si + Ge + Ti) mole ratio is about 0.122 and the Ti/(Si + Ge + Ti) mole ratio is about 0.041. Yamagishi teaches the relevant effects of adding germania and titania at col. 4 lines 11-17 and lines 26-32.

Claims 1, 3, and 4 are rejected under 35 U.S.C. 102(b) as being anticipated by Lehrer (US 4935095).

Lehrer discloses a glass composition comprising between 45 and 50 mole % germania and 50 to 55 mole % silica (claims 21 and 25). The glass composition contains 0 mole % nitrogen. These ranges overlap the ranges recited in present claim 1.

As to claims 3 and 4, Lehrer notes that the glass composition has a thermal expansion coefficient which nearly matches that of silicon (col. 3 lines 55-67). Since the CTE of silicon is about $3.8 \times 10^{-6} / ^\circ\text{C}$ as disclosed in the present specification, it is assumed that the CTE of the Lehrer glass composition falls within the ranges set forth in claims 3 and 4. Furthermore, since the composition is assumed to have a refractive index within the claimed range since the composition is similar to those of the present invention and since fig. 3 of the Maurer et al. reference applied above suggests that a silica-germania glass composition with 45-50 mole % Ge has an index of about 1.51.

Claim 12 is rejected under 35 U.S.C. 102(b) as being anticipated by Hoaglin et al. (US 5841933).

Hoaglin discloses silica-germania-titania glass compositions. In one example, the composition includes 5 wt. % titania, 16 wt. % germania, and the remainder (79 wt. %) silica (col. 3 lines 44-47; claim 14). These weight percentages are equivalent to a Ti/(Si + Ge + Ti) mole ratio of about 0.04 and a Ge/(Si + Ge + Ti) mole ratio of about 0.10. Accordingly, this exemplary Hoaglin glass composition has Ge and Ti mole ratios which lie within the ranges set forth in claim 12.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maurer et al. (cited above).

The Maurer reference is generally directed to optical fiber waveguides, and does not disclose planar waveguides. A person having ordinary skill in the art would have recognized that some of the characteristics of the fiber waveguides manufactured by Maurer would have been beneficial for planar waveguides as well, e.g., low attenuation, high radiation resistance, and comparatively low processing temperatures. Thus it would have been obvious to such a person to use the compositions disclosed by Maurer in making planar waveguide devices.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Allowable Subject Matter

Claims 2, 6-8, 15, and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 9-11 and 17 are allowed.

Claim 2 depends from claim 1, claims 6-8 depend from claim 5, and claims 15-16 depend from claim 14. Maurer et al. was applied to claim 1 and was the only reference applied above to claim 5. Maurer fails to teach or suggest intentionally including nitrogen in the glass composition to achieve the N/(N + O) mole ratio recited in claims 2 and 6. It is noted that while several of the other applied references disclose Ge/(Si + Ge) mole ratios within the range recited by claims 1 and 5, they also fail to teach or suggest the N/(N + O) mole ratio of claims 2 and 6.

As to claims 7-8 and 15-16, although it was argued above that Maurer's teachings could be used in making a planar waveguide as per claim 5, and although Storgaard-Larsen et al. as applied to claim 14 does disclose a planar waveguide, neither of these references teaches or suggests using the resulting planar waveguide in an optical switch having liquid crystal switches at waveguide intersections. Neither reference provides any discussion of properties related to interfacing of waveguides with liquid crystal switches (as applicant does) which would lead a person skilled in the art to recognize these references as being suitably applicable to the optical switches defined by claims 7-8 and 15-16.

Independent claims 9 and 17 recite a method for fabricating a planar optical waveguide on a silicon substrate. Both claims recite the use of a PECVD process, specify compositions for the cladding and core layers, and specify refractive index and CTE values. The closest

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references of record are Storgaard-Larsen (cited above) and Bazylenko et al. (US 6379873, cited on the attached PTO-892 form). Both references disclose using PECVD to deposit a planar waveguide, and both references disclose at least one composition satisfying the conditions of claims 9 and 17. Storgaard-Larsen discloses a core layer having 14 mole % Ge which is relevant to claim 17, and Bazylenko discloses a layer having 25 mole % Ge which is relevant to claim 9. However, neither reference teaches or suggests that the first-deposited cladding layer has a $\text{Ge}/(\text{Si} + \text{Ge})$ or $\text{Ge}/(\text{Si} + \text{Ge} + \text{Ti})$ mole ratio falling within the recited range. In each case only the core layer is doped with Ge. These references provide no teaching or suggestion that both the cladding and the core layers should have the composition set forth in claims 9 and 17. Storgaard-Larsen appears to teach away from this by stating that the undoped silica cladding and buffer layers serve to prevent coupling of the core layer to the surroundings. Bazylenko also refers to the undoped silica layer as a buffer layer. Claims 10-11 are allowable by dependence from claim 9.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6408125, US 4902650, and US 4490737 disclose relevant glass compositions.

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Any inquiry concerning this communication should be directed to Mike Stahl at (703) 305-1520. Official communications eligible for submission by facsimile may be faxed to (703) 308-7724 or (703) 308-7722. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the Technology Center 2800 receptionist at (703) 308-0956 or to the technical support staff supervisor at (703) 308-3072.

MJS

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May 27, 2003

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